

GODDARD SPACE FLIGHT CENTER

Test Lab Report Summary

<i>Report Number:</i>	Q10161	<i>Project:</i>	SWIFT
<i>Part Type:</i>	Microcircuit	<i>System:</i>	BAT
<i>Part Number:</i>	OP283GS	<i>Initiated Date:</i>	05/01/2001
<i>Date Code:</i>	0016	<i>Report Date:</i>	06/18/2001
<i>Manufacturer:</i>	Analog Devices	<i>Investigator:</i>	C. Greenwell (562)
<i>Generic Number:</i>	OP283	<i>Requester:</i>	B. Meinhold (562)
<i>Purchase Spec:</i>	Commercial	<i>Approval / Date:</i>	

Step 1: INCOMING INSPECTION

<u>Test</u>	<u>Quantity</u>	<u>Passed</u>	<u>Failed</u>
External Visual	N/A	N/A	N/A
PIND Condition A	N/A	N/A	N/A

Step 2: DESTRUCTIVE PHYSICAL ANALYSIS

Destructive Physical Analysis (DPA) was conducted per GSFC document “Plastic Encapsulated Microcircuit (PEM) Guidelines for Screening and Qualification for Space Applications”, except that cross-section was done without dye penetrant and glassivation integrity testing was not performed.

No rejectable defects or anomalies were observed during this analysis.

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Summary of Analysis:

<i>Serial Number</i>	<u>J09</u>	<u>U13</u>	<u>U15</u>	<u>V11</u>	<u>V13</u>
<i>External Examination</i>					
1. Markings - legibility and correctness _____	A	A	A	A	A
2. Integrity of package seals _____	N/A	N/A	N/A	N/A	N/A
3. Condition of external leads and plating _____	A	A	A	A	A
4. Overall package condition _____	A	A	A	A	A
<i>Radiographic Examination</i>					
5. Die bonding material and die alignment _____	A	A	A	A	A
6. Package seal integrity _____	N/A	N/A	N/A	N/A	N/A
7. Presence of foreign material _____	A	A	A	A	A
8. Lead dress (if revealed) _____	A	A	A	A	A
<i>Acoustic Microscopy Inspection</i>					
9. Condition of material interfaces (delaminations) _____	A	A	A	A	A
10. Condition of molding material (voids, cracks) _____	A	A	A	A	A
<i>Internal Examination (including cross-section)</i>					
11. Presence of foreign material _____	A	A	A	A	A
12. Mechanical condition of die _____	A	A	A	A	A
13. Wire bonds and lead dress _____	A	A	A	A	A
14. Die bonding material _____	A	A	A	A	A
15. Condition of die surface _____	A	A	A	A	A
16. Condition of metallization _____	A	A	A	A	A
17. SEM Examination _____	A	A	A	N/P	N/P
<i>Bond Strength</i>					
18. Strength _____	A	A	A	N/P	N/P
19. Metallization adherence _____	A	A	A	N/P	N/P
<i>Die Bond Strength</i>					
20. Strength _____	N/P	N/P	N/P	N/P	N/P

SN's V11 and V13 subjected to cross-sectional examination.

(* = Refer to comments, A = acceptable, U = unacceptable, N/A = not applicable, N/P = not performed)

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Appended Photographs:

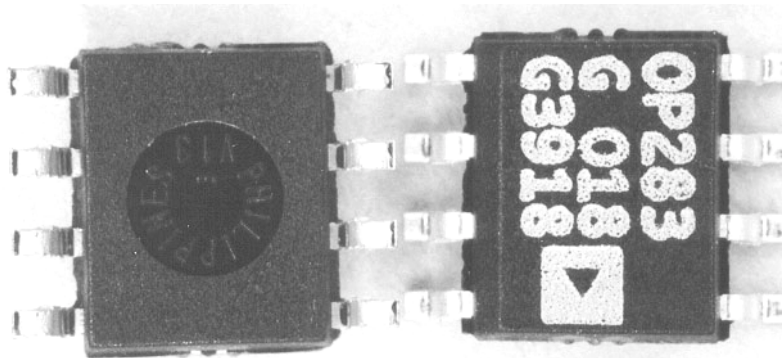


Figure 1. External top and bottom views of the OP283GS devices. Although difficult to see in this image, the bottom of the devices have embossed markings. Each device had a unique two or three character alphanumeric code that was used for reference designations during this analysis. 8X

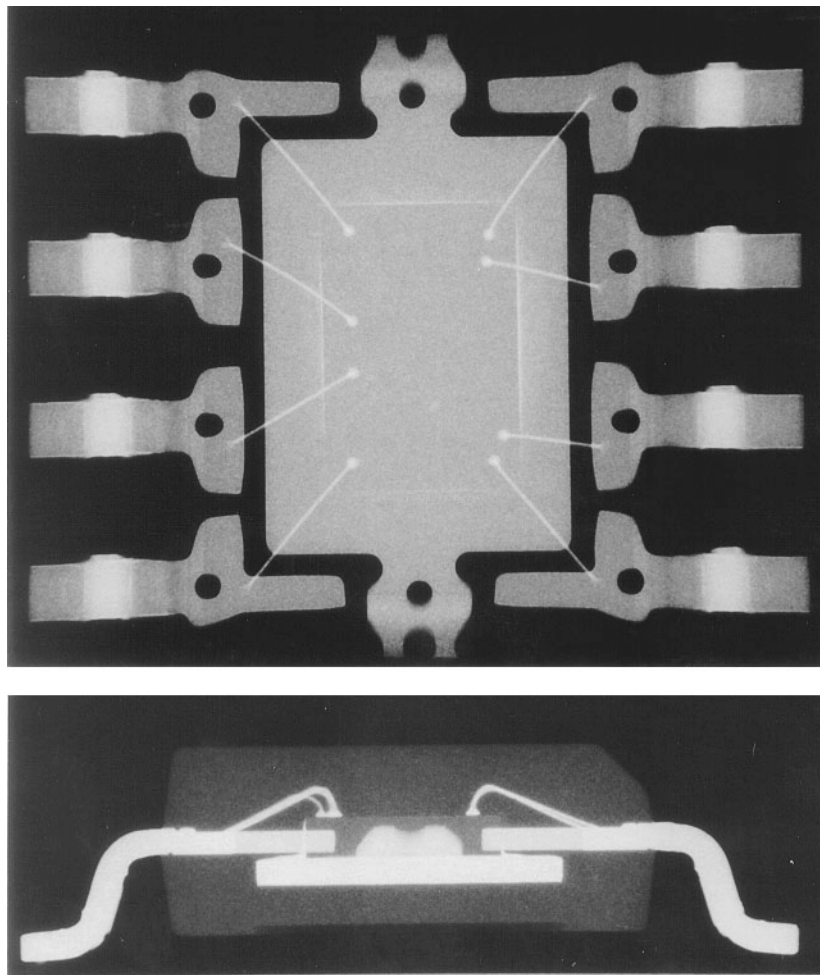


Figure 2. Top and side view radiographic images. 16X

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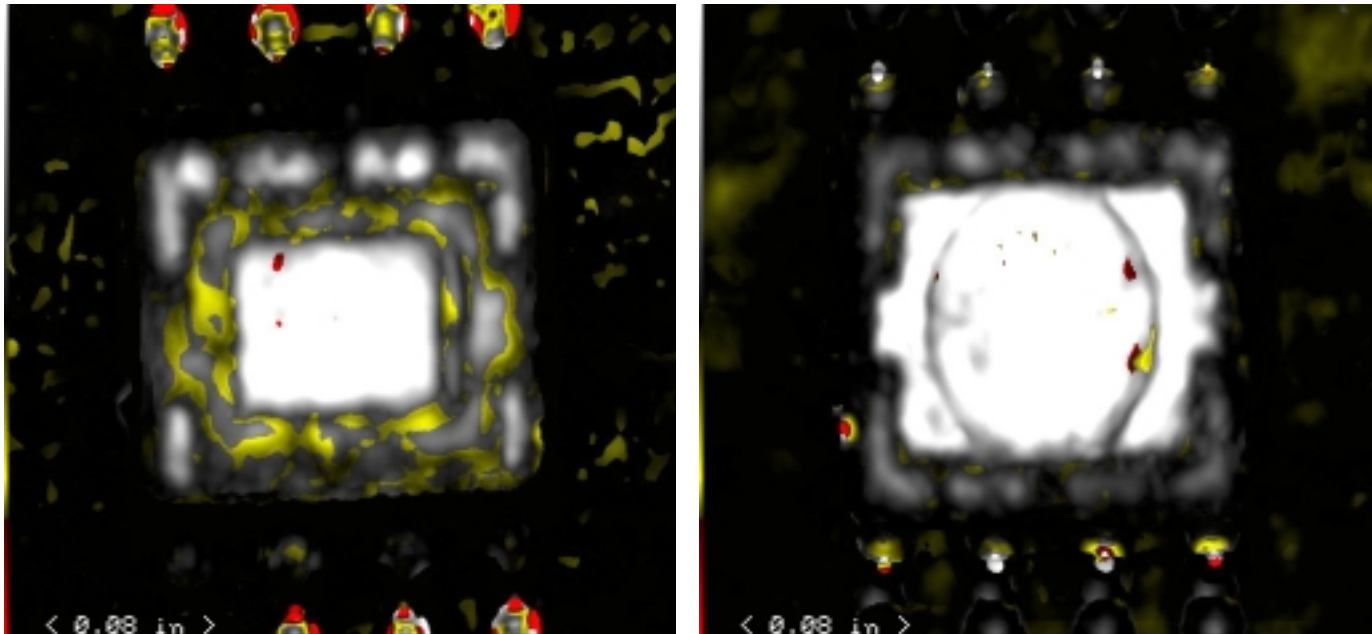


Figure 3. Top (left) and bottom C-SAM images of SN J09.

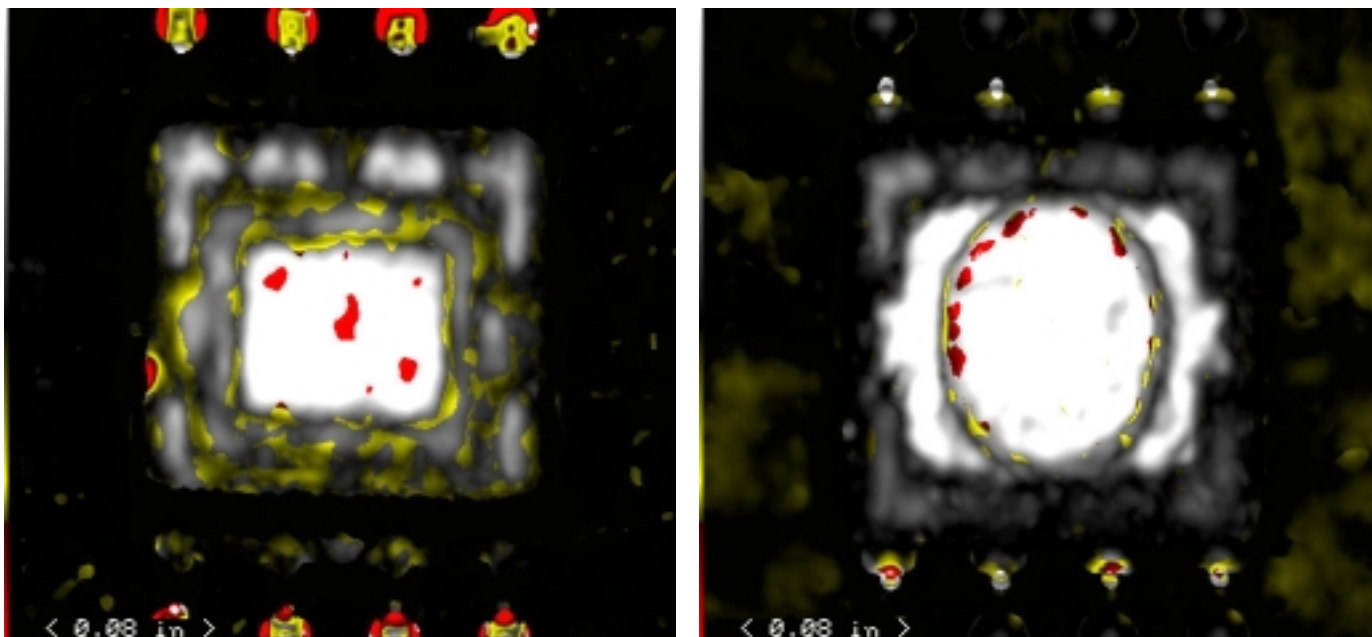


Figure 4. Top (left) and bottom C-SAM images of SN U13.

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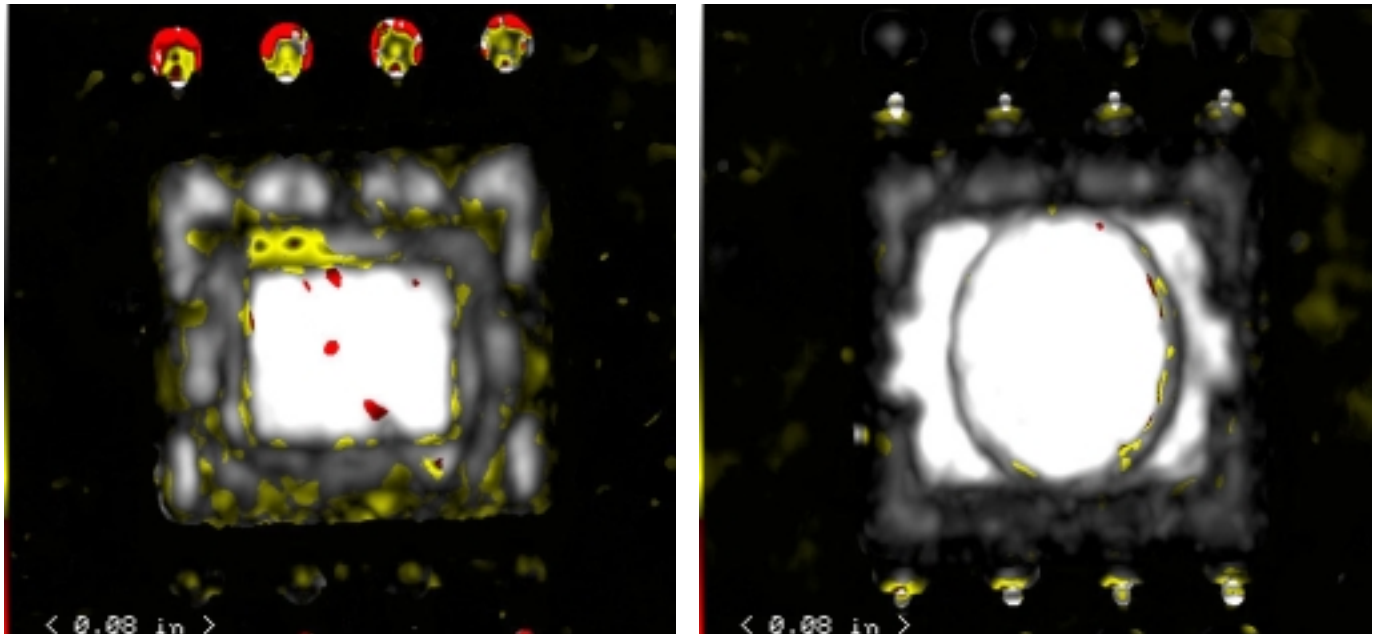


Figure 5. Top (left) and bottom C-SAM images of SN U15.

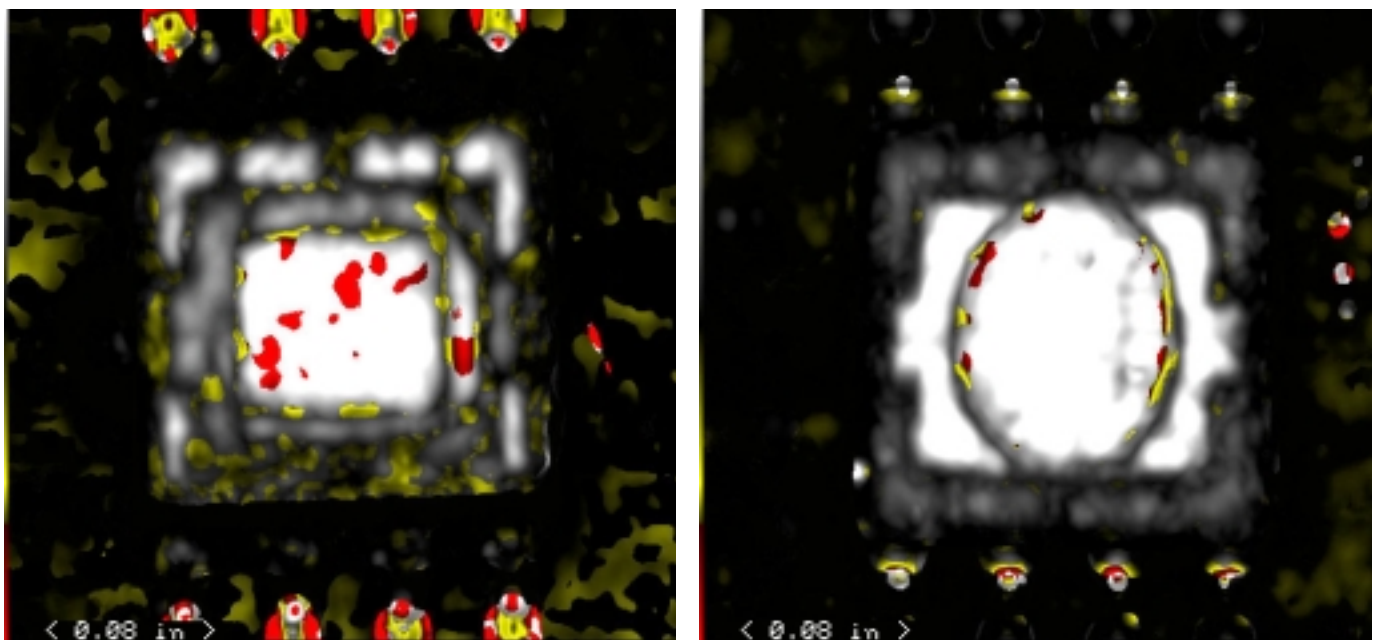


Figure 6. Top (left) and bottom C-SAM images of SN V11.

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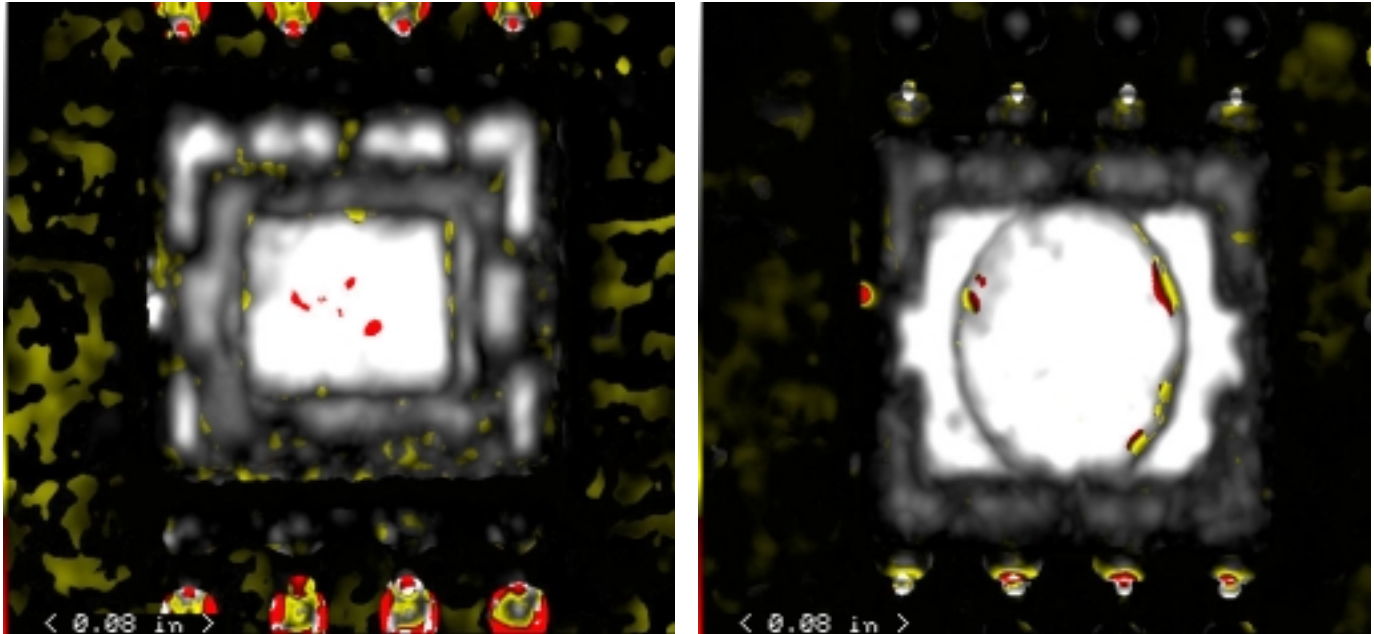
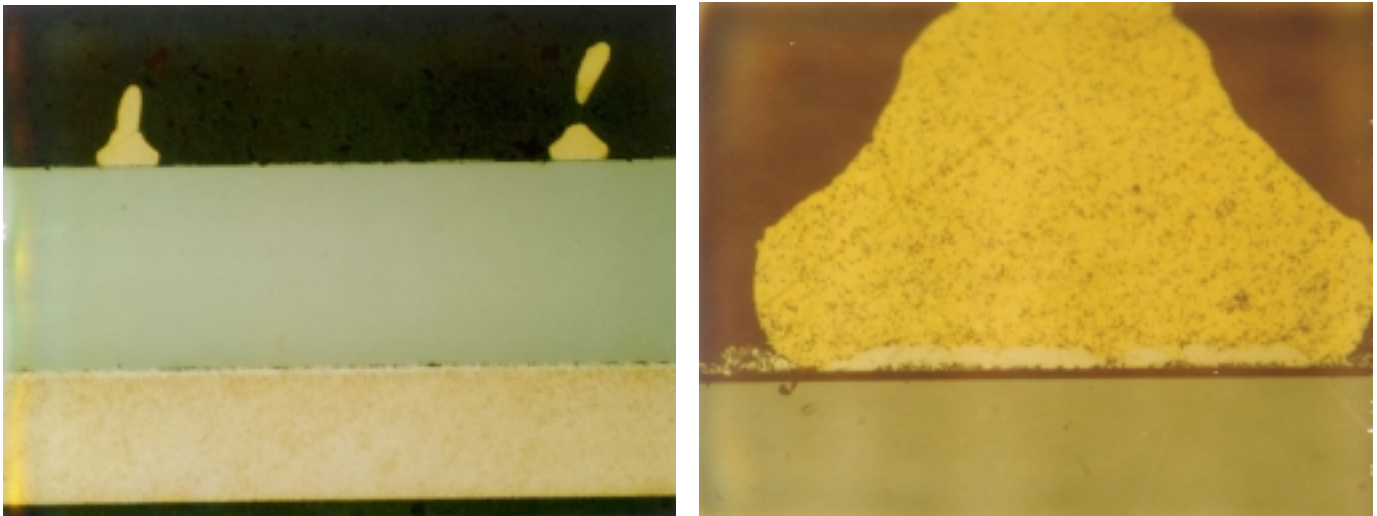


Figure 7. Top (left) and bottom C-SAM images of SN V13.

Figure 8. Cross-section images of SN V11. No delaminations or anomalies were observed, consistent with the C-SAM inspection results. Left image $\approx 100X$; right $\approx 1000X$.

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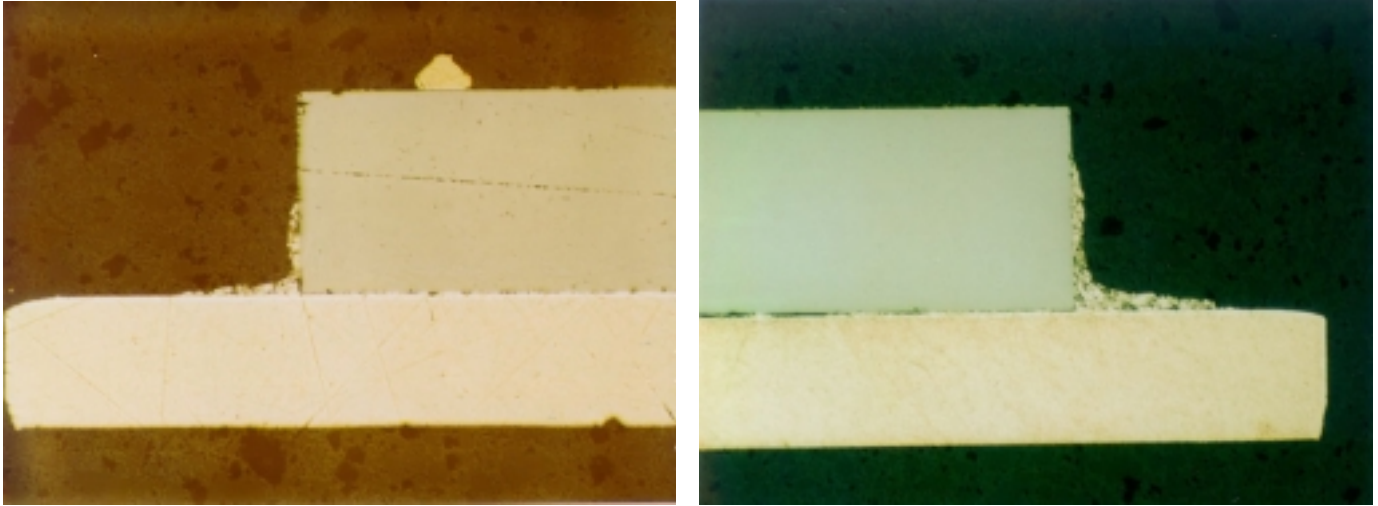


Figure 9. Cross-section images of SN V13, taken at different section planes. No delaminations or anomalies were observed. Both images $\approx 100X$.

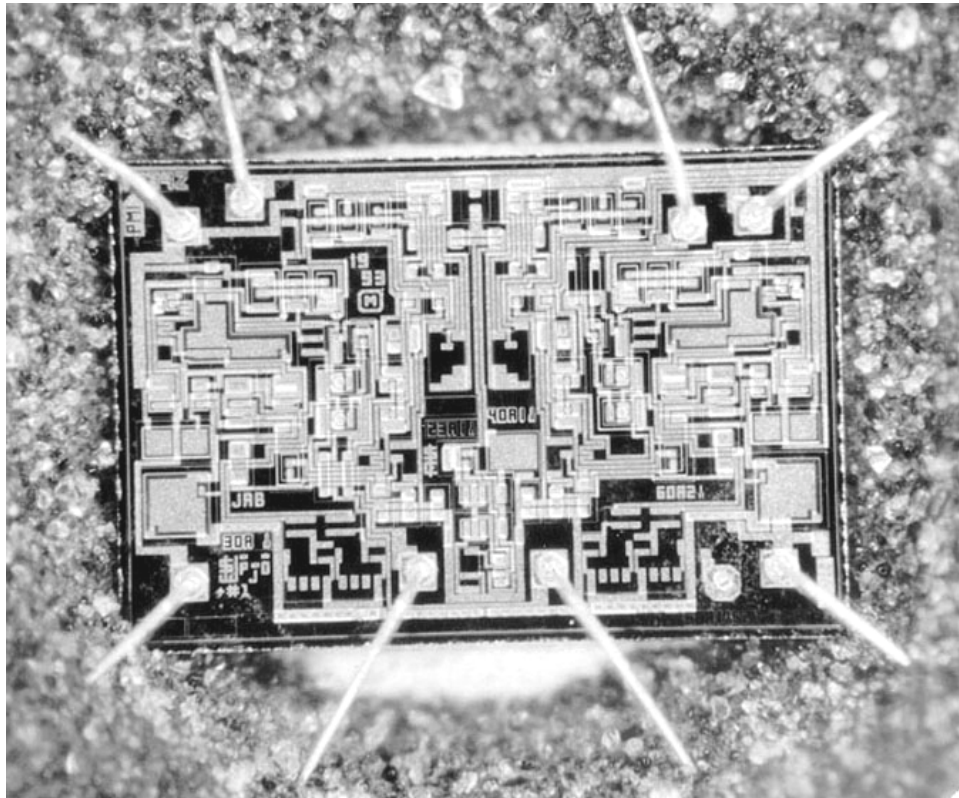


Figure 10. Internal view of SN U15 after deprocessing to reveal the die and bond wires. 32X

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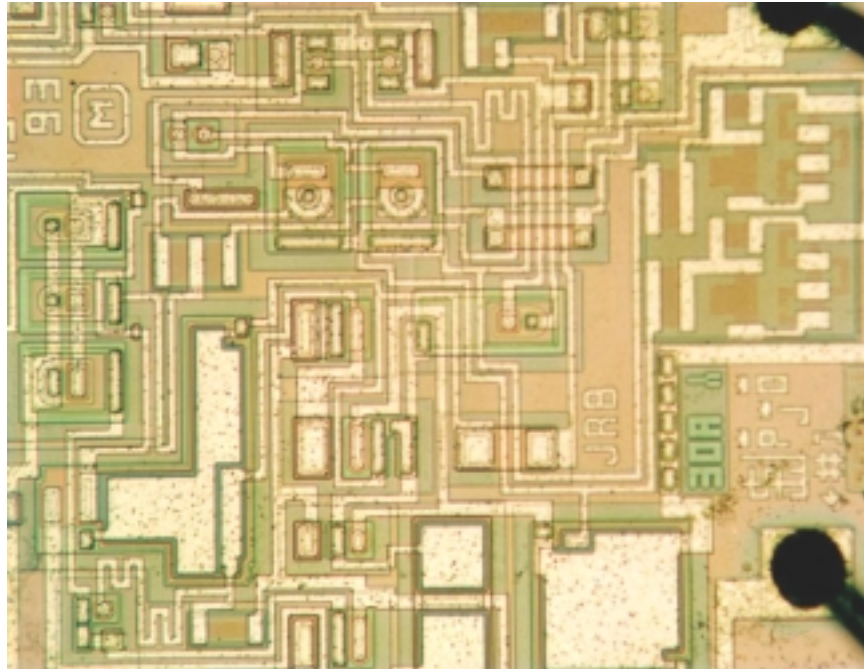
Appended Photographs:

Figure 11. Optical micrograph image of U15 shows general device features. Foreign material on the die surface is deprocessing residue. 100X

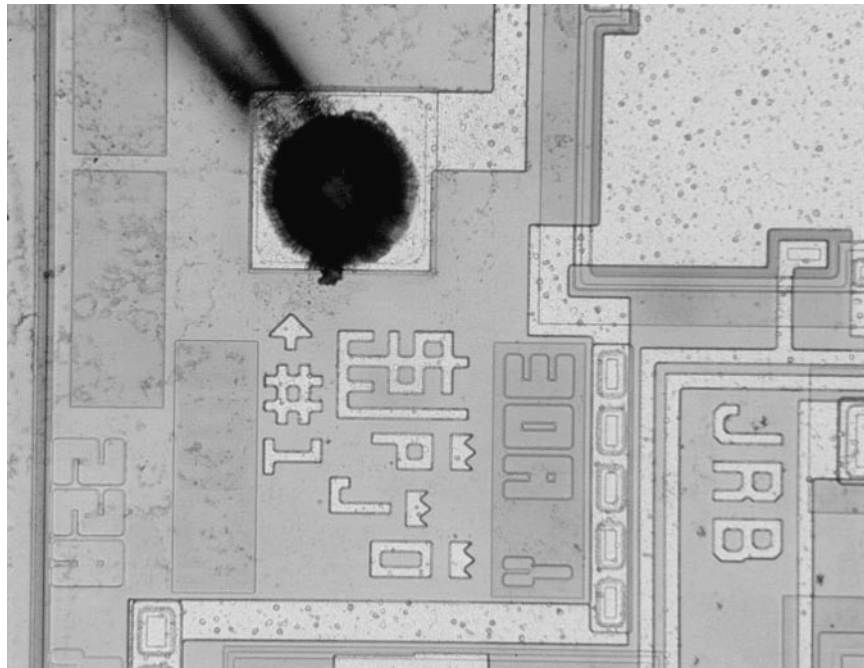


Figure 12. Optical micrograph image of SN U13 shows worst case bond placement and general device features and markings. 200X

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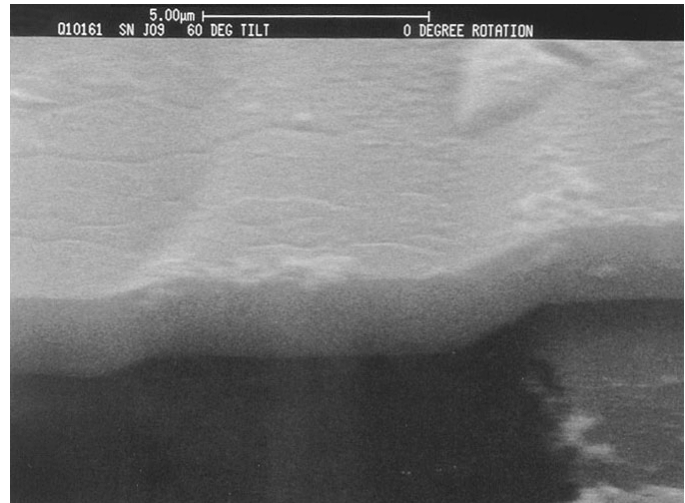
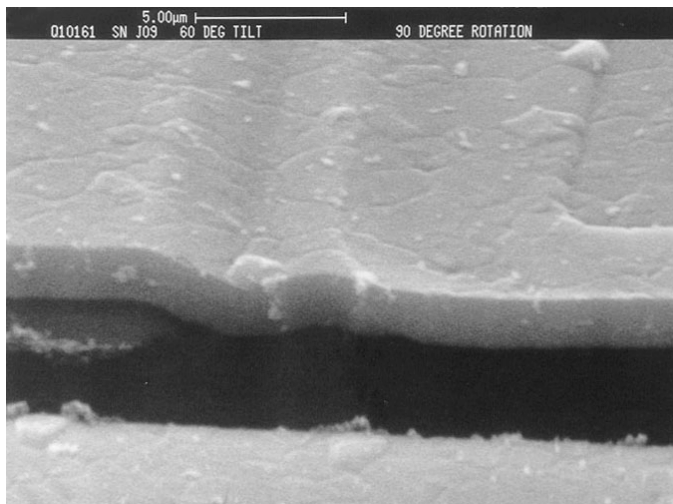


Figure 13. SEM micrographs of SN J09. The metallization has excellent step coverage.

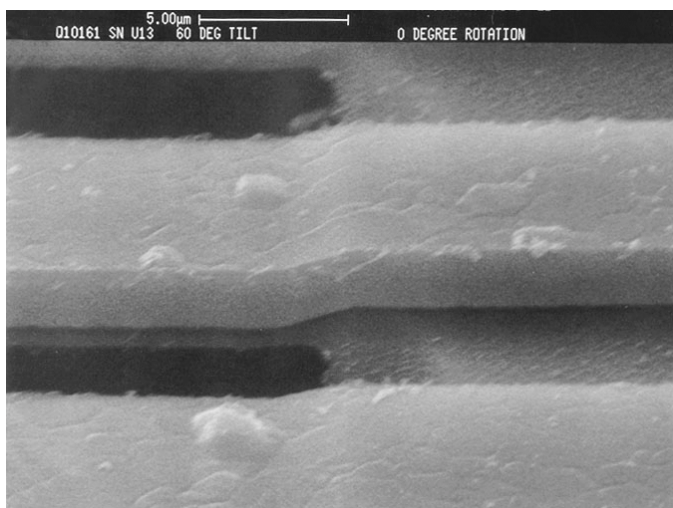


Figure 14. SEM micrographs of SN U13.

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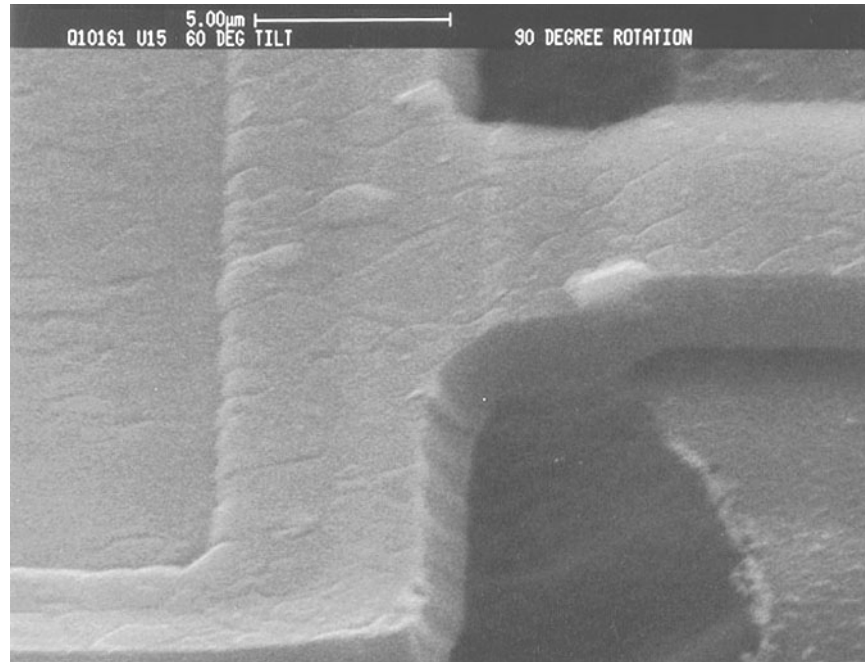


Figure 15. SEM micrograph of SN U15.

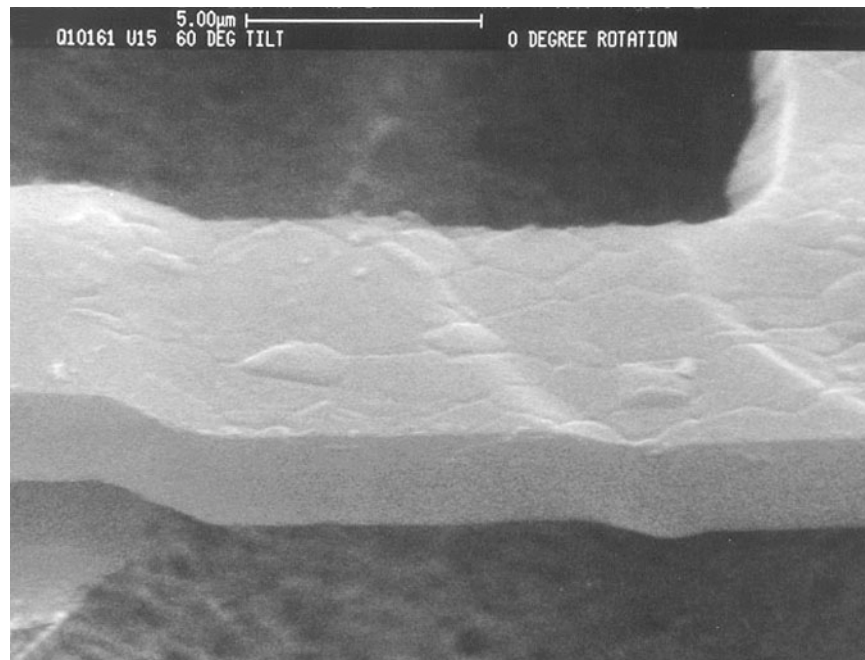


Figure 16. SEM micrographs of SN U15.